

A REVISION OF THE SUBGENUS *PSEUDOSTEGANA* OF THE GENUS *STEGANA* (DIPTERA: DROSOPHILIDAE), WITH DESCRIPTIONS OF EIGHT NEW SPECIES¹

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Abstract. A revision of the subgenus *Pseudostegana* of the genus *Stegana* is made with descriptions of 8 new species from New Guinea, the Philippines and Sabah. A key to the species is constructed automatically from a taximetric analysis of the wing patterns.

The subgenus *Pseudostegana* Okada of the genus *Stegana* Meigen has been known to include only 4 species: *grandipalpis* Takada & Momma, 1975, from Malaya (type-species); *fleximediata* Takada, Momma & Shima, 1973, from Sabah; *javana* Okada, 1978, from Java; and *malayana* Okada, 1978, from Malaya. My examination of the Bishop Museum collection in 1978 has revealed 8 more species belonging to this subgenus, all new species to be described here. In addition, a taximetric analysis of the wing patterns was carried out to clarify relationships among these 12 species.

The type specimens of the new species are deposited in the Bishop Museum, Honolulu, Hawaii.

Stegana (*Pseudostegana*) *latiparma* Okada, new species

Fig. 1A, 3A-C

♂, ♀. Body about 3.0-3.5 mm in length. Antenna with 2nd joint orange-brown; 3rd orange-gray, long and apically pointed. Arista with about 7 upper and 1 lower branches and a moderate fork. Frons (Fig. 3C) orange-brown, anteriorly as broad as median length; frontal shield glossy dark brown, very broad (thus the specific name). Face orange-brown. Anterior reclinate orbital seemingly absent; proclinate close to posterior reclinate, which is as long as proclinate. Vibrissa rather weak, other orals fine. Mesoscutum subshining deep brownish black. Scutellum matte velvety brown. Thoracic pleura glossy dark brown. Lateral scutellars convergent; apicals as long as laterals and nearer to each other than to laterals. Humeral 1. Anterior dorsocentrals minute. Sterno-index 0.2. Legs glossy pale brown; femora and mid and hind tibiae glossy black. Wing (Fig. 1A) hyaline, with 3 black crossbands; median one straight, across posterior crossvein; basal one oblique, deep black; apical one triangular, not extending below R_{2+3} . C-index 1.6; 4V-index 4.0; 4C-index 2.3; 5x-index 1.1; Ac-index 18; C3-fringe $\frac{3}{4}$. Halteres yellowish brown. Abdominal tergites glossy black. Periphallallic organs (Fig. 3A) dark brown; surstylus quadrate, without teeth; epandrium narrowing above. Phallic organs (Fig. 3B) brown; aedeagus apically narrowing, basally with a pair of serrate flaps; paramere longer than aedeagus, distally tapering.

Holotype ♂ (BISHOP 11,921), IRIAN: NEW GUINEA (NW): Ifar, Cyclops Mts, 300 m, 22.VI.1959, Maa; allotype ♀ (BISHOP), Bomberi, S, Vogelkop, 700-900 m, 6.VI.1959, Maa.

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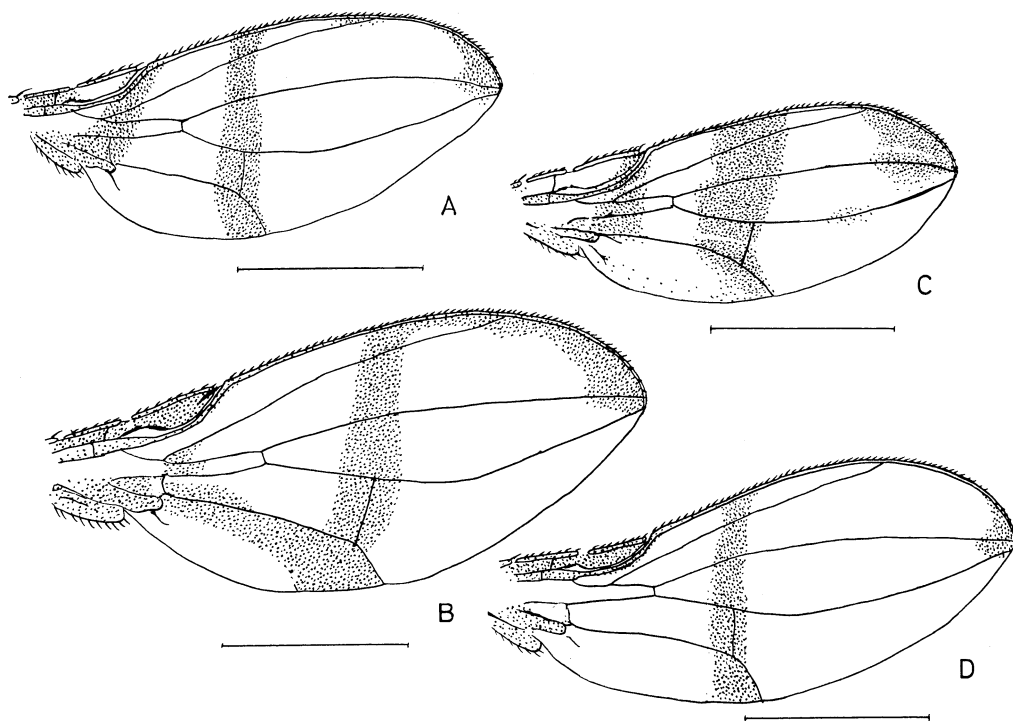


FIG. 1. Wings of *Stegana* (*Pseudostegana*): A, *latiparma*; B, *campanularia*; C, *hirta*; D, *zonaria*. Scales = 1 mm.

Paratypes. IRIAN: 1♂, Japen I, SSE Sumberbaba, Dawai Riv, 6.VI.1959, Holtmann. PNG: NEW GUINEA (NE): 1♀, Karimui, S of Goroka, 1000 m, 6.VII.1961, Gressitt; 1♂, 1♀, Wau, 11.VII.1956, 13.X.1962, Sedlacek. PHILIPPINE IS: 1♂, Camarines Sur, Mt Isarog, 500 m, 5.IV.1963, Torre Villas; 1♂, Misamis Or., Minubanan, 1050–1200 m, 5–19.IV.1961, Torre Villas.

Distribution. New Guinea, Philippines.

This species resembles *S. fleximediata* in wing pattern, but it differs from the latter in having the median crossband of the wing reaching C, and M not very sinuated.

***Stegana* (*Pseudostegana*) *campanularia* Okada, new species**

Fig. 1B, 3D–F

♂. Body about 3 mm in length. Eye brown. Antenna with 2nd joint orange-brown, 3rd gray-brown. Arista with about 9 upper and 1 lower branches and a moderate fork. Palpus brown, large and broad. Frons (Fig. 3F) and periorbits orange-brown; frontal shield anteriorly $\frac{1}{3}$ as broad as frons, caudally broadened in a bell shape (thus the specific name), laterally black. Cheek very narrow. Procline orbital as long as posterior reclinate; anterior reclinate very fine. Second oral fine. Mesoscutum and scutellum matte orange-brown; scutellum laterally darker; thoracic pleura also darker. Humeral 1. Acrostichal hairs in about 10 rows. Legs yellow; femora and mid and hind tibiae black. Wing (Fig. 1B) hyaline, with 3 black crossbands and a black longitudinal stripe along Cu. C-index 1.7; 4V-index 2.6; 4C-index 1.6; 5x-index 0.7; Ac-

index 20; C3-fringe 5/6. Halteres yellowish gray, base of knob black. Abdominal tergites glossy black; 2nd tergite medially orange-brown. Periphallalic organs (Fig. 3D) brownish black; epandrium with long hairs below; surstylus small, quadrate. Phallic organs (Fig. 3E) dark brown; aedeagus ellipsoidal, apically pointed; paramere as long as aedeagus.

Holotype ♂ (BISHOP 11,920), PHILIPPINE IS: Mindanao: Misamis Or., Mt Ponalini, 800–1000 m, 9.X.1965, Torrevillas.

Distribution. Philippines.

This species resembles *S. malayana* in the frontal shield, wing patterns, and male genitalia, but it differs from the latter in having the anterior crossvein clear and the paramere simple.

***Stegana (Pseudostegana) hirta* Okada, new species**

Fig. 1C, 3G–I

♂, ♀. Body about 3 mm in length. Eye brown. Antenna with 2nd joint orange-brown; 3rd grayish brown, proximally paler. Arista with 8 long upper and 1 very long lower branches and a large fork. Frons (Fig. 3I) orange-brown, caudally darker, anteriorly as broad as median length; frontal shield $\frac{1}{3}$ as broad as frons, caudally much broadened. Face grayish white. Cheek very narrow, grayish yellow. Clypeus yellowish gray. Anterior reclinate orbital minute, at middle between proclinate and posterior reclinate, which is longer than proclinate. Second oral $\frac{1}{2}$ as long as vibrissa, very thin. Mesoscutum matte orange-brown, mediocaudally dark in ♂, entirely dark brown in ♀. Scutellum matte brown, anterolateral corners yellowish white, laterally dark. Thoracic pleura brown. Lateral scutellars divergent, slightly longer than apicals, which are $2\times$ as far apart from laterals as from each other. Humeral 1, long. Acrostichal hairs in about 10 rows. Anterior dorsocentrals minute, just before posteriors. Sternopleurals 1, long. Legs yellowish gray; fore and hind metatarsi longer than other tarsal joints; mid metatarsus $2\times$ as long as other tarsal joints. Wing (Fig. 1C) hyaline, with 3 broad black crossbands. A faint dark patch often present at middle of M_{1+2} . C-index 2.0; 4V-index 2.3; 4C-index 1.3; 5x-index 0.8; Ac-index 10; C3-fringe $\frac{3}{4}$. Halteres yellow, basally black. Abdominal tergites black, subshining or shining. Periphallalic organs (Fig. 3G) yellowish brown; epandrium broadly truncate below; surstylus and cercus globular. Phallic organs (Fig. 3H) dark brown; aedeagus narrowly pointed apically, laterally hairy (thus the specific name); paramere simple, tapering.

Holotype ♂ (BISHOP 11,917), allotype ♀ (BISHOP), PHILIPPINE IS: Luzon: Nueva Vizcaya, Dalton Pass, 915 m, 9–10.IV.1968, Hardy.

Distribution. Philippines.

This species resembles *S. latiparma* in having 3 separated black bands on the wing, but it differs from the latter in having the median band much broader, the frontal shield narrower, and the aedeagus hairy.

***Stegana (Pseudostegana) zonaria* Okada, new species**

Fig. 1D, 4A–C

♂. Body about 3 mm in length. Eye dark red. Antenna with 2nd joint orange-brown, 3rd gray. Arista with 7 upper and 1 lower branches and a moderate fork. Palpus brownish black, large and broad. Periorbits matte brown. Frons anteriorly as broad as median length, caudally broadened; frontal shield (Fig. 4C) glossy dark brown, triangular, anteriorly narrowly pointed. Face orange-brown. Clypeus orange-brown. Anterior reclinate orbital fine; proclinate as long as posterior reclinate. Vibrissa moderate, 2nd oral fine. Mesoscutum matte brown, anterior border orange. Scutellum matte brown. Thoracic pleura shining brownish black, ventrally and

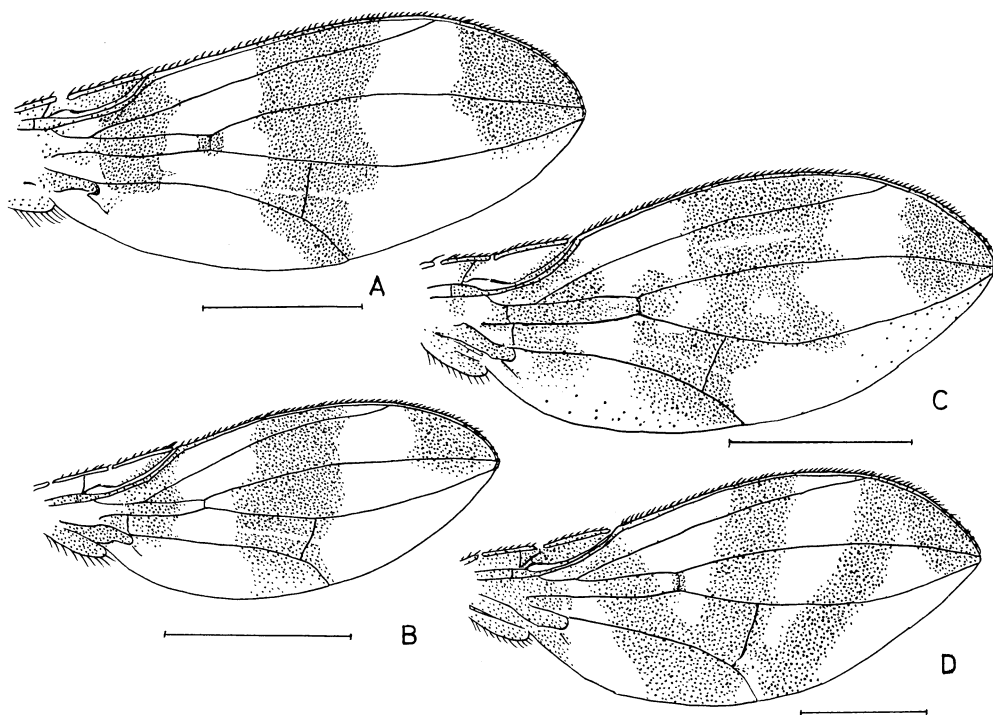


FIG. 2. Wings of *Stegana* (*Pseudostegana*): **A**, *latizonaria*; **B**, *lineoparma*; **C**, *albinotata*; **D**, *lacrymaria*. Scales = 1 mm.

caudally matte dark brown. Lateral scutellars as long as apicals, which are nearer to each other than to laterals. Humeral 1, strong. Acrostichal hairs in about 10 rows. Anterior dorsocentrals fine. Legs yellowish gray; femora of mid and hind tibiae black; fore metatarsus as long as 3 succeeding tarsal joints; mid metatarsus longer than other tarsal joints; hind metatarsus as long as 2 succeeding tarsal joints. Wing (Fig. 1D) hyaline, with 3 black crossbands (thus the specific name); basal band interrupted at middle; median band narrow, extending from costa to caudal margin of wing; apical band small. C-index 1.5; 4V-index 3.5; 4C-index 2.0; 5x-index 1.3; Ac-index 10; C3-fringe $\frac{3}{4}$. Halteres yellowish gray, medially black. Abdominal tergites matte black. Periphallalic organs (Fig. 4A) black; cercus paler; epandrium truncate below, dorsally not much narrowing; surstylus ventrocaudally pointed. Phallic organs (Fig. 4B) mostly black; aedeagus apically tapering; paramere nearly straight and as long as aedeagus.

Holotype ♂ (BISHOP 11,919), PNG: NEW GUINEA (NE): W Sepik, Eliptamin Val, 1200–1350 m, 1–15.VIII.1959, Brandt. 1 paratype, PNG: NEW GUINEA (NE), Wau, Nami Crk, 1950 m, 17.VIII.1965, Sedlacek.

Distribution. NE New Guinea.

This species resembles *S. latiparma* in having a narrow median black band on the wing and a small apical band, but it differs from the latter in having the basal band of the wing interrupted at the middle and the frontal shield narrowing anteriorly.

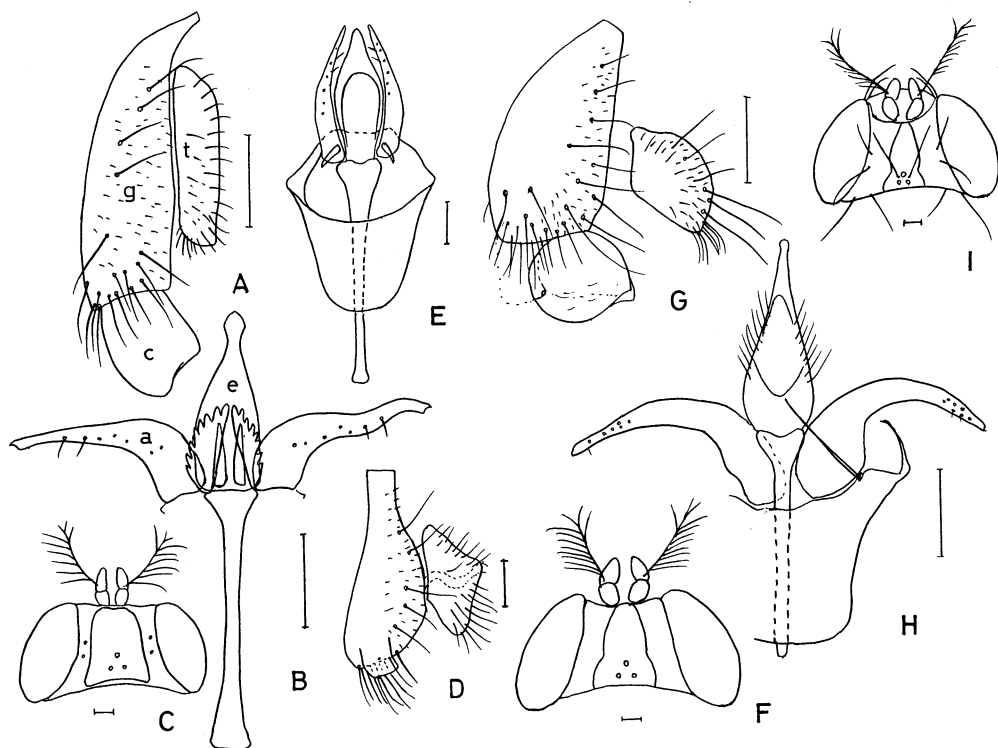


FIG. 3. Periphallic organs (A, D, G), phallic organs (B, E, H) and head (C, F, I) of *Stegana* (*Pseudostegana*): A-C, *latiparma*; D-F, *campanularia*; G-I, *hirta*. a = paramere; c = surstylus; e = aedeagus; g = epandrium; t = cercus. Scales = 1 mm.

Stegana (*Pseudostegana*) *latizonaria* Okada, new species

Fig. 2A, 4D-F

♂. Body about 3 mm in length. Eye (Fig. 4F) dark red. Antenna with 2nd joint yellowish brown, 3rd grayish brown, long. Arista with 8 upper and 1 lower long branches and a moderate fork. Palpus matte black, slender. Frons orange-brown, anteriorly as broad as median length; frontal shield darker, anteriorly narrowing. Face subshining gray. Clypeus yellowish brown. Cheek gray, very narrow. Anterior reclinate orbital minute, just between proclinate and posterior reclinate. Vibrissa long; 2nd and 3rd orals nearly as long as vibrissa. Mesoscutum subshining orange-brown. Scutellum matte brown, apically pale. Apical scutellars as long as laterals, nearer to each other than to laterals. Thoracic pleura glossy brownish black. Humeral 1, strong. Acrostichal hairs in about 14 rows. Anterior dorsocentrals fine, close to posteriors. Sterno-index 0.25. Legs yellowish brown; fore and mid metatarsi longer than other tarsal joints; mid metatarsus 2× as long as other tarsal joints. Wing (Fig. 2A) hyaline, with 3 broad black crossbands (thus the specific name), and a black spot on anterior crossvein. C-index 1.6; 4V-index 2.7; 4C-index 1.8; 5x-index 1.0; Ac-index 10; C3-fringe $\frac{3}{4}$. Halteres yellowish white. Abdominal tergites glossy black. Periphallic organs (Fig. 4D) black; cercus yellow; epandrium narrowing above; surstylus caudoventrally pointed. Phallic organs (Fig. 4E) generally black; aedeagus distally narrowly pointed; paramere slender, curved, as long as aedeagus.

Holotype ♂ (BISHOP 11,918), PHILIPPINE IS: Luzon: Nueva Vizcaya, 6 km W of Imugan, 11.IV.1968, Hardy. 1♂ paratype, same data as holotype.

Distribution. Philippines.

This species resembles *S. hirta* in having broad black bands on the wing, but it differs from the latter in the absence of a black spot on the anterior crossvein and in the bare aedeagus.

***Stegana (Pseudostegana) lineoparma* Okada, new species**

Fig. 2B, 4G–I

♂. Body about 2.5 mm in length. Eye dark brown. Antenna with 2nd joint yellowish orange, dorsally dark; 3rd grayish brown, ventrally paler. Arista with about 7 upper and 1 lower branches and a large fork. Palpus broad, yellowish brown. Frons matte orange-yellow, anteriorly as broad as median length, caudally slightly broadened; frontal shield (Fig. 4I) very narrow (thus the specific name), not well demarcated. Face gray. Cheek narrow, yellowish white. Clypeus yellowish brown. Mesoscutum yellowish orange, medially dark. Scutellum matte yellowish brown, laterally dark. Thoracic pleura yellowish orange, glossy black below. Legs pale yellow; fore femur basally brown; fore and hind metatarsi longer than other tarsal joints; mid metatarsus nearly 2× as long as other tarsal joints. Wing (Fig. 2B) hyaline, with 3 broad black crossbands. C-index 1.7; 4V-index 1.8; 4C-index 1.2; 5x-index 0.7; Ac-index 20; C3-fringe $\frac{5}{7}$. Halteres yellow, base of knobs dark. Abdominal tergites yellowish brown, with broad brownish caudal bands. Periphallallic organs (Fig. 4G) pale yellow; epandrium not much narrowing above; surstylus weakly pointed at caudoventral corner. Phallic organs (Fig. 4H) pale yellow; aedeagus elliptical, laterally serrate; paramere slightly longer than aedeagus.

Holotype ♂ (BISHOP 11,923), IRIAN: NEW GUINEA (NW): Waris, S of Hollandia, 450–500 m, 17.VIII.1959, Maa. 2♂ paratypes, same data as holotype.

Distribution. New Guinea.

This species resembles *S. hirta* in wing patterns but differs from the latter in the narrow frontal shield and laterally serrate aedeagus.

***Stegana (Pseudostegana) albinotata* Okada, new species**

Fig. 2C, 4J–L

♂. Body about 3 mm in length. Eye dark red. Antenna matte black. Arista with 8 upper and 1 lower branches and a moderate fork. Palpus black, broad. Frons matte dark brown, anteriorly as broad as median length; frontal shield (Fig. 4L) very narrow, paler than other parts of frons. Face gray. Cheek brown, narrow. Clypeus brownish black. Anterior reclinate orbital fine; posterior reclinate as long as proclinate. Second oral as long as vibrissa. Mesoscutum yellowish white, anteromedially brownish black. Scutellum matte velvety black. Thoracic pleura yellowish white; sternepisternum brownish black. Lateral scutellars divergent, apicals slightly nearer to each other than to laterals. Humeral 1. Acrostichal hairs in about 12 rows. Anterior dorsocentrals fine, close to posteriors. Sterno-index 0.4. Legs yellowish white; fore and mid coxae, mid and hind knee joints and apex of mid tibia black; ultimate tarsal joints dark; fore metatarsus as long as succeeding 3 tarsal joints; mid metatarsus 2× as long as other tarsal joints. Wing (Fig. 2C) hyaline, with 3 large black crossbands; median one covering both anterior and posterior crossveins, leaving 2 white spots at middle. C-index 2.3; 4V-index 3.3; 4C-index 1.6; 5x-index 0.9; Ac-index 14; C3-fringe $\frac{3}{5}$. Halteres yellowish white, with knobs black outside. Abdominal tergites matte gray, with broad brownish caudal bands, which are protruded at middle. Periphallallic organs (Fig. 4J) dark brown; epandrium not much narrowing above, broadly truncate

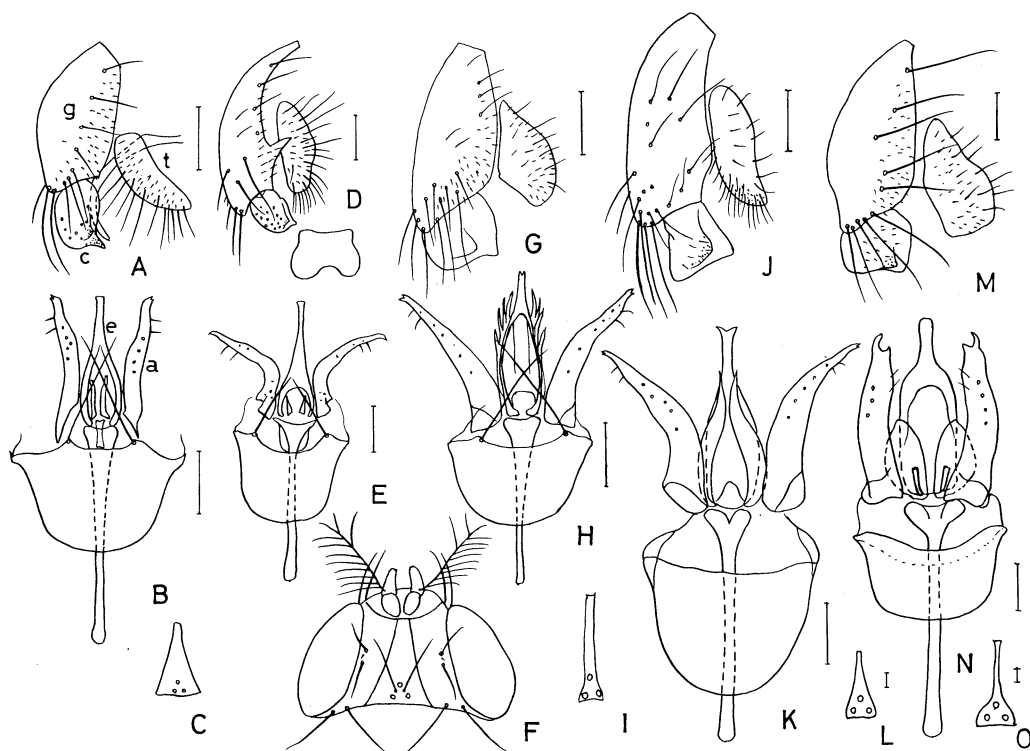


FIG. 4. Periphallallic organs (A, D, G, J, M), phallic organs (B, E, H, K, N), head (F), and frontal shield (C, I, L, O) of *Stegana* (*Pseudostegana*): A–C, *zonaria*; D–F, *latizonaria*; G–I, *lineoparma*; J–L, *albinotata*; M–O, *lacrymaria*. Signs and scales as in Fig. 3.

below; surstylus quadrate. Phallic organs (Fig. 4K) brown; aedeagus apically narrowing and bifid; paramere distally black and tapering, as long as aedeagus.

Holotype ♂ (BISHOP 11,924), PHILIPPINE IS: Luzon, Nueva Viscaya, W of Imugan, 11.IV.1968, Hardy. 2♂ paratypes, same data as holotype.

Distribution. Philippines.

This species differs from all of the other known species of the subgenus in having a large median black band on wing, covering both anterior and posterior crossveins.

***Stegana* (*Pseudostegana*) *lacrymaria* Okada, new species**

Fig. 2D, 4M–O

♂. Body about 4 mm in length. Eye castaneous red. Antenna matte yellowish gray. Arista with about 9 upper and 1 lower branches and a moderate fork. Palpus yellowish gray. Frons matte brown, anterior and posterior corners yellow, anteriorly slightly narrower than median length; frontal shield (Fig. 4O) lacrymaria-shaped (thus the specific name). Face, cheek and clypeus yellowish gray. Procline orbital as long as posterior reclinate; anterior reclinate minute. Second oral short. Mesoscutum and scutellum matte black, humeral callus yellow; thoracic pleura matte brownish black, gray pruinose, with a white streak above. Lateral scutellars di-

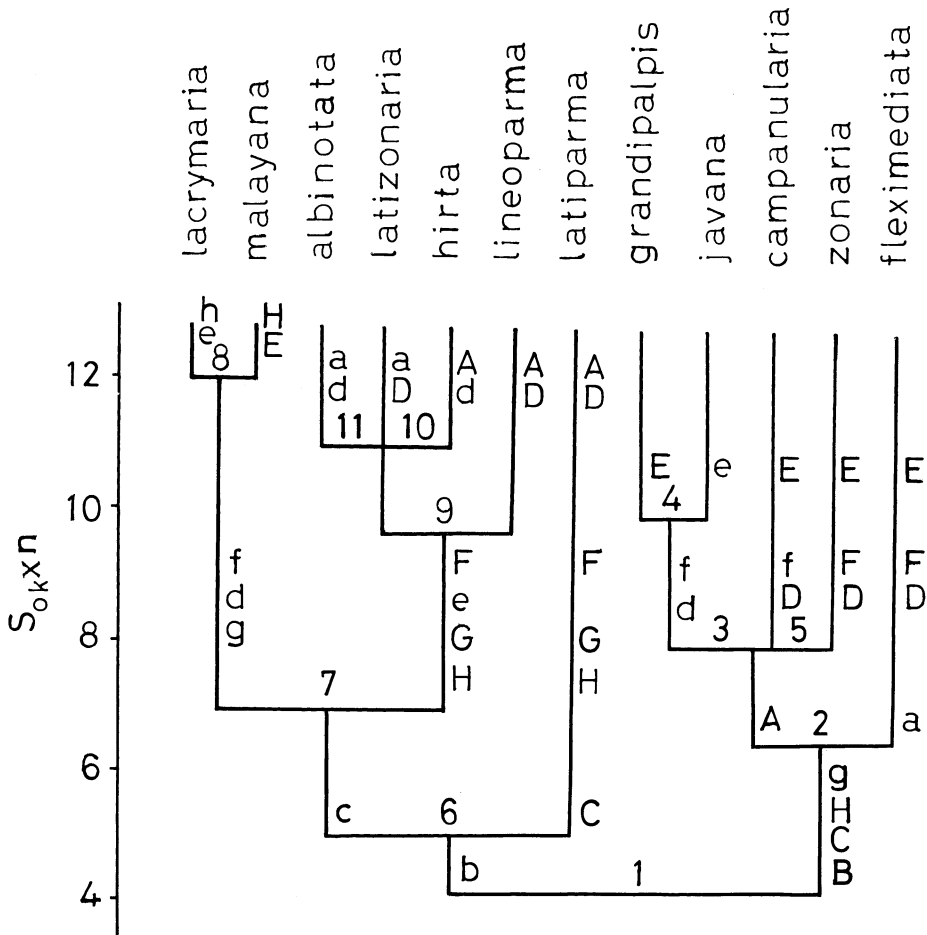


FIG. 5. A dendrogram of the species of *Stegana* (*Pseudostegana*) derived from taximetrical analysis of wing patterns using S_{0k} proximity analysis and UPGA cluster analysis. Numbers attached on the branching points of dendrogram correspond to couplets in the key. n = number of characters. Character codes as in text.

vergent; apicals nearer to each other than to laterals. Humeral 1, long. Acrostichal hairs in about 12 rows. Anterior sternopleural rather long. Legs yellowish gray; mid femur, distal ½ of hind femur and base of mid tibia black; fore and hind metatarsi longer than other tarsal joints; mid metatarsus 2× as long as other tarsal joints. Wing (Fig. 2D) hyaline, with 5 broad black crossbands; median 3 bands caudally convergent to become joined. C-index 2.0; 4V-index 2.5; 4C-index 1.5; 5x-index 0.6; Ac-index 15; C3-fringe ⅔. Halteres black. Abdominal tergites matte black, somewhat blue pruinose. Periphallic organs (Fig. 4M) black; cercus paler; epandrium narrowing above, obliquely truncate below; surstylus quadrate. Phallic organs (Fig. 4N) dark brown; aedeagus ellipsoidal, distally narrowly pointed; paramere apically bifid, as long as aedeagus.

TABLE 1. Characters ($n = 8$) $\times$ taxa ($t = 12$) matrix for 12 species of *Stegana* (*Pseudostegana*).

<i>t</i>	CHARACTER CODES*							
	A	B	C	D	E	F	G	H
<i>grandipalpis</i>	0	0	0	1	0	1	1	0
<i>fleximediata</i>	1	0	0	0	0	0	1	0
<i>javana</i>	0	0	0	1	1	1	1	0
<i>malayana</i>	1	1	1	1	0	1	1	0
<i>latiparma</i>	0	1	0	0	0	0	0	0
<i>campanularia</i>	0	0	0	0	0	1	1	0
<i>hirta</i>	0	1	1	1	1	0	0	0
<i>zonaria</i>	0	0	0	0	0	0	1	0
<i>latizonaria</i>	1	1	1	0	1	0	0	0
<i>lineoparma</i>	0	1	1	0	1	0	0	0
<i>albinotata</i>	1	1	1	1	1	0	0	0
<i>lacrymaria</i>	1	1	1	1	1	1	1	1

* See text for key to codes.

Holotype ♂ (BISHOP 11,922), MALAYSIA: SABAH: Tenompok, 48 km E of Jesselton, 1460 m, 26–31.I.1959, Maa.

Distribution. Sabah.

This species differs from any other known species of the subgenus in having 5 broad black bands on the wing.

TAXIMETRICAL ANALYSIS OF THE WING PATTERNS

The wing patterns of 12 *Pseudostegana* species ($t = 12$) are taximetrically analyzed to find relationships among species. Eight characters ($n = A-H$) are recognized in the patterns, and each character is coded 0 (with a large letter) and 1 (with a small letter) according to presumed plesiomorph and presumed apomorph, respectively.

A—Anterior crossvein clear ($A = 0$) or clouded ($a = 1$)

B—Basal band interrupted ($B = 0$) or continuous ($b = 1$)

C—Median band narrower than ($C = 0$) or as broad as ($c = 1$) the distance between anterior and posterior crossveins

D—Black patch on M_{1+2} absent ($D = 0$) or present ($d = 1$)

E—Apical band small ($E = 0$) or broad ($e = 1$)

F—Black stripe on Cu_{1a} absent ($F = 0$) or present ($f = 1$)

G—Costal cell before the 2nd costal break clear ($G = 0$) or black ($g = 1$)

H—Black oblique stripe through black spot on M_{1+2} absent ($H = 0$) or present ($h = 1$)

From the $n \times t$ matrix (Table 1), at $t \times t$ matrix is produced through S_{ok} proximity analysis: $S_{ok} = (2n_{JK} + n_{jk})/n$ where n_{JK} is the number of presumed synapomorphs and n_{jk} is the number of presumed symplesiomorphs. Then, a dendrogram (Fig. 5)

is established by means of UPGA cluster analysis of the $t \times t$ matrix. From this dendrogram, a key to species is automatically constructed, as below.

KEY TO SPECIES OF THE SUBGENUS *Pseudostegana*

1. Basal band interrupted (B); median band narrower than distance between anterior and posterior crossveins (C); black oblique stripe through black spot on M_{1+2} absent (H); C-cell black (g) 2
 Basal band continuous (b) 6
2. Anterior crossvein clouded (a); black spot on M_{1+2} absent (D); apical band small (E); black stripe on Cu_{1a} absent (F) **fleximediata**
 Anterior crossvein clear (A) 3
3. Black patch on M_{1+2} present (d); black stripe on Cu_{1a} present (f) 4
 Black patch on M_{1+2} absent (D); apical band small (E) 5
4. Apical band small (E) **grandipalpis**
 Apical band broad (e) **javana**
5. Black stripe on Cu_{1a} absent (F) **zonaria**
 Black stripe on Cu_{1a} present (f) **campanularia**
6. Median band narrower than distance between anterior and posterior crossveins (C); anterior crossvein clear (A); black patch on M_{1+2} absent (D); black stripe on Cu_{1a} absent (F); C-cell clear (G); black oblique stripe through black spot on M_{1+2} absent (H) **latiparma**
 Median band as broad as distance between anterior and posterior crossveins (c) 7
7. Black stripe on Cu_{1a} present (f); C-cell black (g); black patch on M_{1+2} present (d) 8
 Black stripe on Cu_{1a} absent (F); C-cell clear (G); apical band large (e); black oblique stripe through black spot on M_{1+2} absent (H) 9
8. Apical band large (e); black oblique stripe through spot on M_{1+2} present (h) **lacrymaria**
 Apical band small (E); black oblique stripe through spot on M_{1+2} absent (H) **malayana**
9. Anterior crossvein clear (A); black patch on M_{1+2} absent (D) **lineoparma**
 Not simultaneously as above 10
10. Anterior crossvein clear (A); black spot on M_{1+2} present (d) **hirta**
 Anterior crossvein clouded (a) 11
11. Black patch on M_{1+2} present (d) **albinotata**
 Black patch on M_{1+2} absent (D) **latizonaria**

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